Values Written as Powers

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CONCEPT **1** Values Written as Powers

Here you'll learn how to write the product of repeated values using powers.

Remember Miguel and the tiger cage? Well, while he was working on his design, he also went and visited a friend in another zoo.This zoo also had a tiger cage, and it had dimensions for height, length and width just like the one that Miguel was working to design.

The tiger cage at this zoo had a width of 18 feet, a height of 18 feet and a length of 18 feet. Miguel wrote down 18 x 18 x 18 in his notebook.

There is an easier way to write this though. In this Concept, you will learn how to write the product of repeated factors by using powers. Pay attention and you will be able to do this by end of the Concept.

Guidance

In the last Concept, we took bases with exponents and wrote them out as factors.

We can also work the other way around. We can take repeated factors and rewrite them as a power using an exponent.

To work in this way, we will count the number of times the base is being multiplied. This becomes our exponent. Remember that an exponent is the little number that tells you how many times to multiply the base by itself.

$$7 \times 7 \times 7 = \underline{}$$

There are three seven's being multiplied. We rewrite this as a base with an exponent.

$$7 \times 7 \times 7 = 7^3$$

Now let's practice with a few examples.

Example A

$$6 \times 6 \times 6 \times 6$$

Solution: 6^4

Example B

$$2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

Solution: 2^7

Example C

$$3 \times 3$$

Solution: 3^2

Now let's go back to the original problem about the dimensions of the tiger cage.

Miguel wrote down 18 feet x 18 feet x 18 feet. Because these are repeated factors being multiplied, Miguel can use a short - cut and use an exponent to express the repeated multiplication. 18 is the base. Because it is being multiplied three times, three is the exponent.

The solution is 18^3.

Vocabulary

Here are the vocabulary words used in this Concept.

Whole number a number that represents a whole quantity

Base the whole number part of a power

Power the value of the exponent

Exponent the little number that tells how many times we need to multiply the base by itself

Squared the name used to refer to the exponent 2

Cubed the name used to refer to the exponent 3

Guided Practice

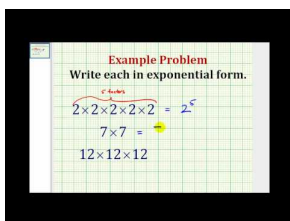Here's one for you to try on your own.

$$4 \times 4 \times 4 \times 4$$

Answer

4^4

Video Review

Here is a video to help you to review this concept.

Practice

Directions: Write each repeated factor using a power.

1. $4 \times 4 \times 4$

2. $3 \times 3 \times 3 \times 3$

3. 2×2

4. $9 \times 9 \times 9 \times 9 \times 9$

5. $10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$

6. $1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1$

7. $3 \times 3 \times 3 \times 3 \times 3 \times 3$

8. 4×4

9. $7 \times 7 \times 7$

10. $6 \times 6 \times 6 \times 6$

11. $11 \times 11 \times 11$

12. 12×12

13. $18 \times 18 \times 18$

14. $21 \times 21 \times 21 \times 21$

15. 17×17